



Natural Resource Assessments in Afghanistan Supported by High Resolution Digital Elevation Modeling and Multi-spectral Image Analysis

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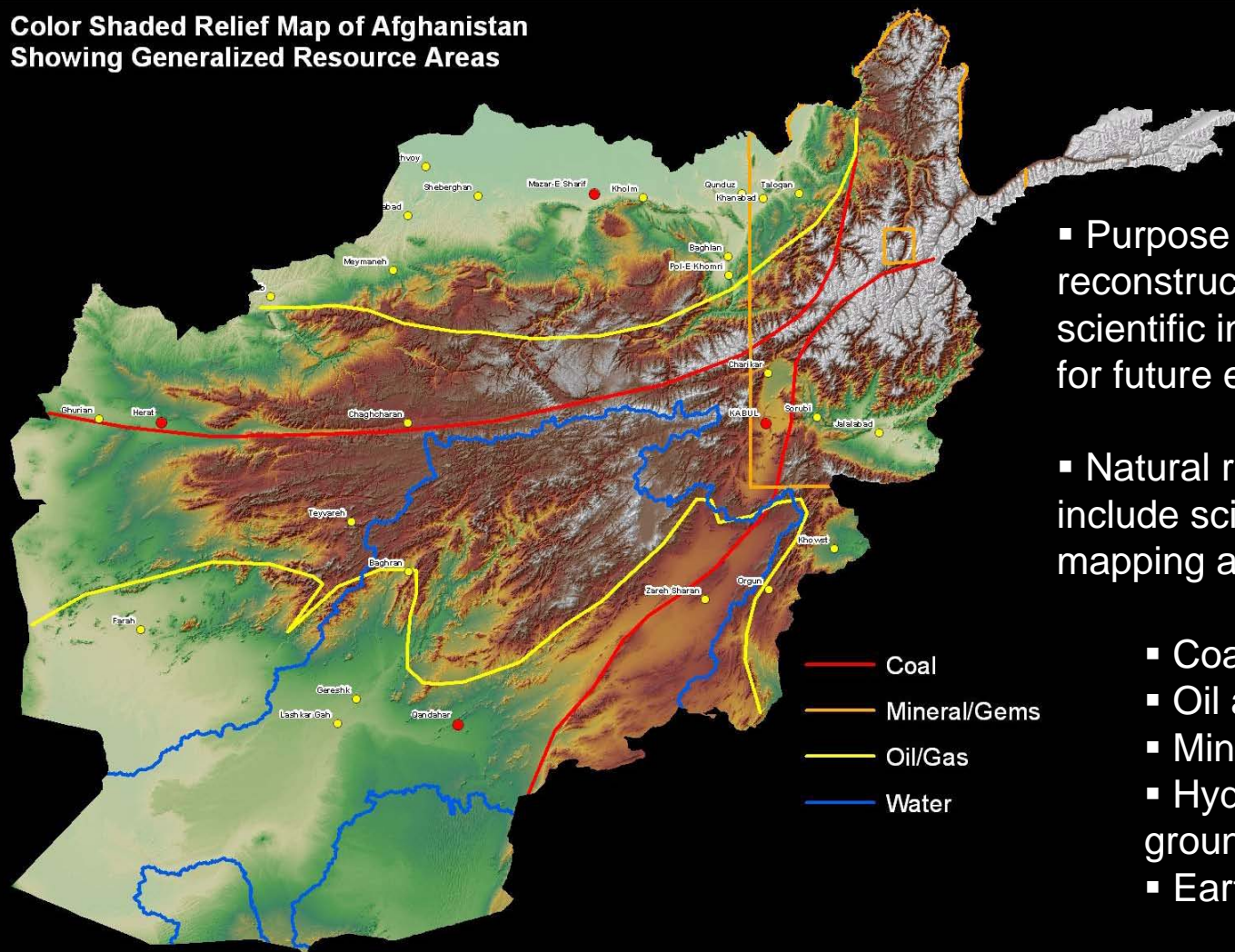
Afghanistan
Engineer District



U.S. Department of the Interior
U.S. Geological Survey

USGS/USAID Natural Resource Assessments

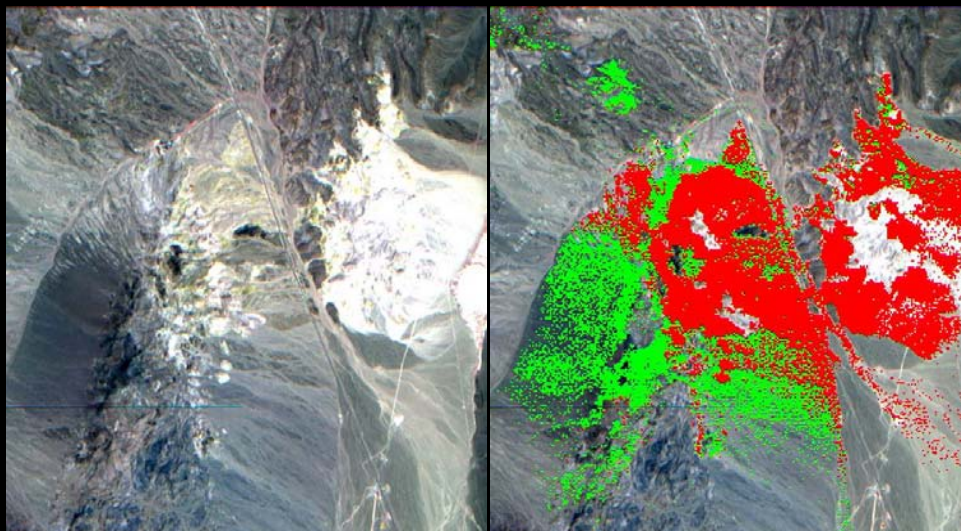
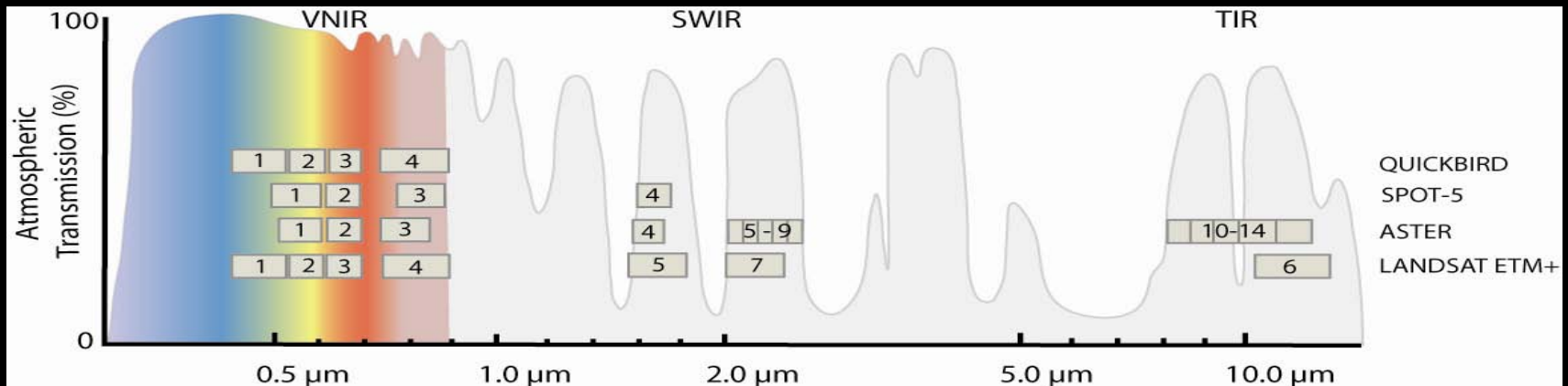
Color Shaded Relief Map of Afghanistan
Showing Generalized Resource Areas



- Purpose is to support reconstruction activities by providing scientific information and foundation for future economic activities.
- Natural resource assessments include scientific investigations and mapping activities for:
 - Coal
 - Oil and natural gas
 - Minerals
 - Hydrologic resources – groundwater and surface water
 - Earthquake and flood hazards

Natural Resource Assessments Require Remote Sensing and GIS

Spectral Resolution of Quickbird, Landsat 7 ETM+, and ASTER and band ratios used for mineral mapping



ASTER BAND RATIO AND RBD IMAGES

B3/B2 - VEGETATION

B2/B1 - Fe^{3+}

$(B4+B6) / B5$ - ALUNITE, KAOLINITE

$(B5+B7) / B6$ - MUSCOVITE, SMECTITE-ILLITE, SERICITE

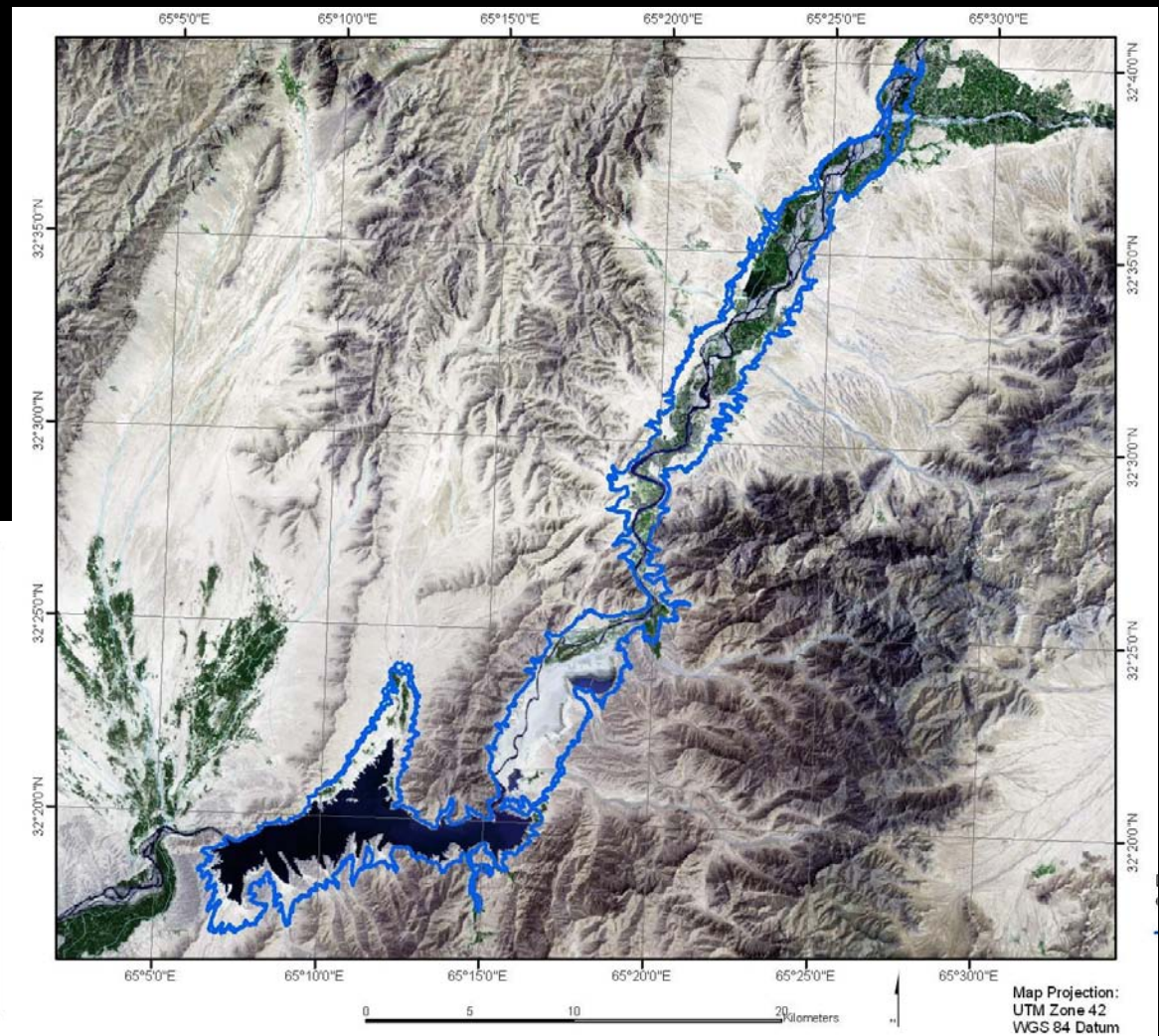
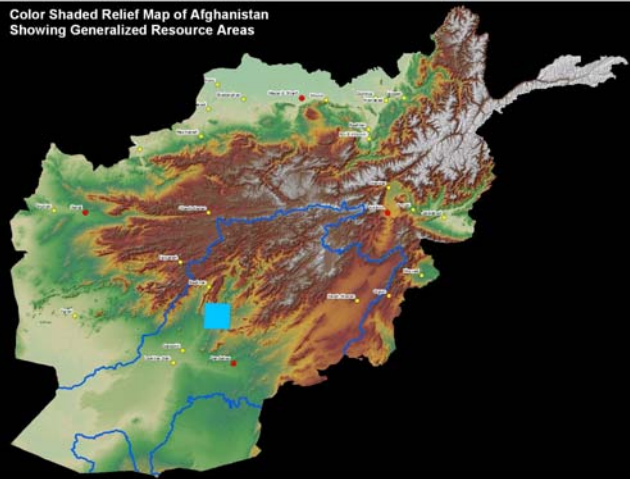
$(B7+B9) / B8$ - CARBONATE, EPIDOTE, CHLORITE

$B14 / B12$ - QUARTZ-RICH ROCKS

Kajakai Dam and Spillway Level Increase: Location and Plan

- Kajakai Dam and Reservoir in Helmand and Uruzgan Provinces, SW Afghanistan

Color Shaded Relief Map of Afghanistan
Showing Generalized Resource Areas



Kajakai Dam and Spillway Level Increase

- Terrain Visualization of Kajakai Dam



Image Credit: Digital Globe, Inc.

Kajakai Dam and Spillway Level Increase: SRTM Elevation Data

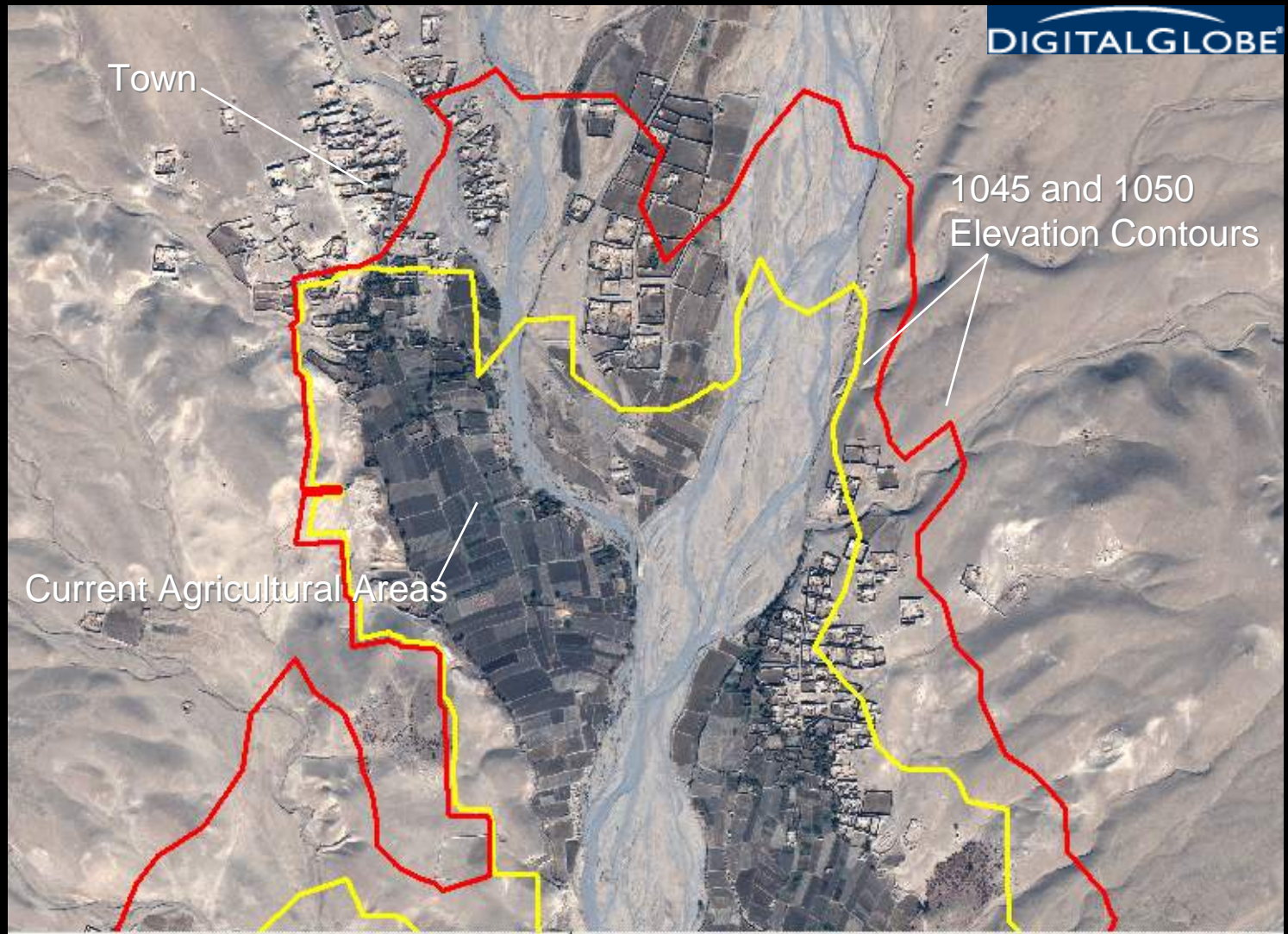


Image Credit: Digital Globe, Inc.

Need for More Accurate and Refined Elevation Model

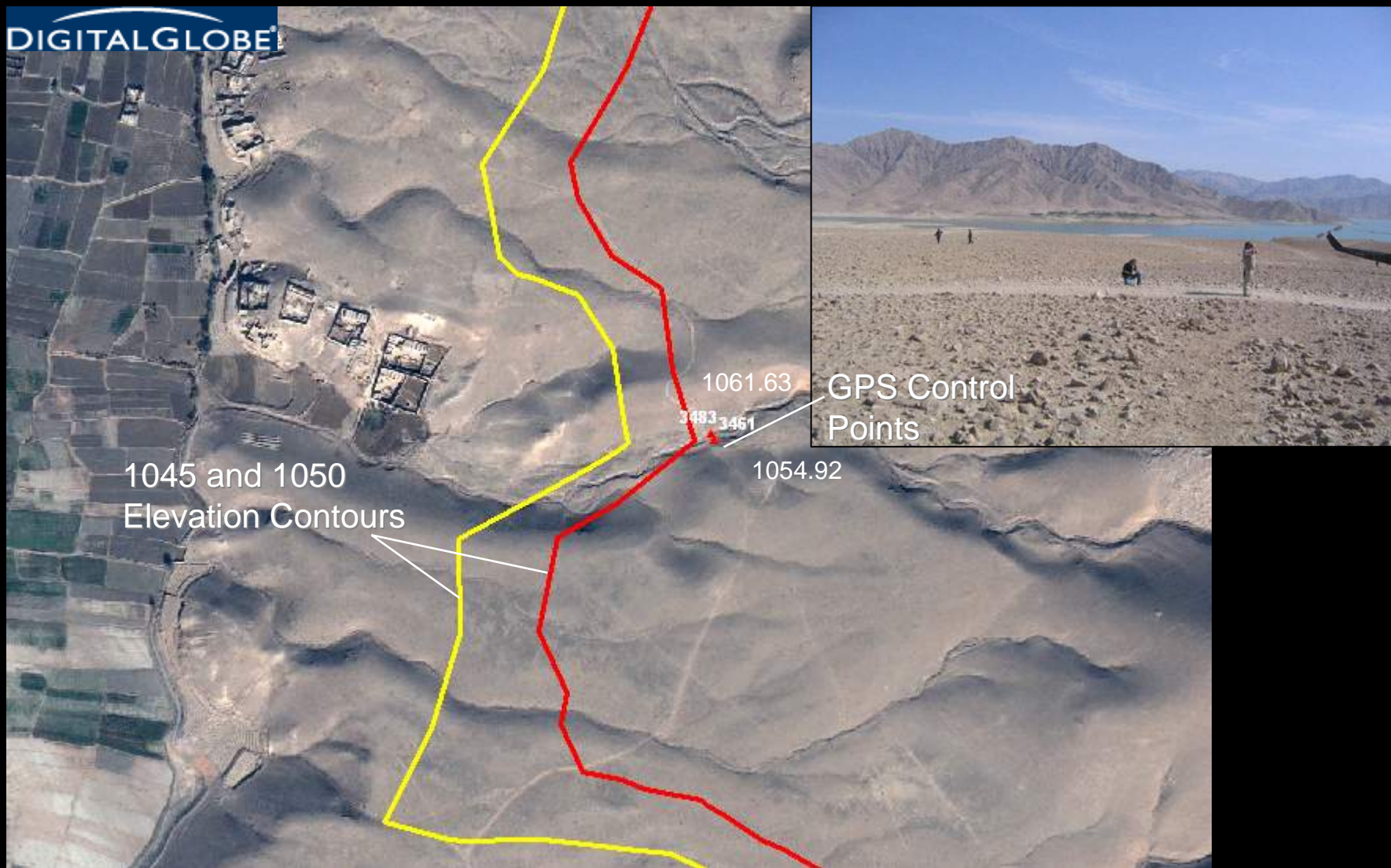


Image Credit: Digital Globe, Inc.

SPOT5 2.5m Resolution Panchromatic Image Stereo Collection

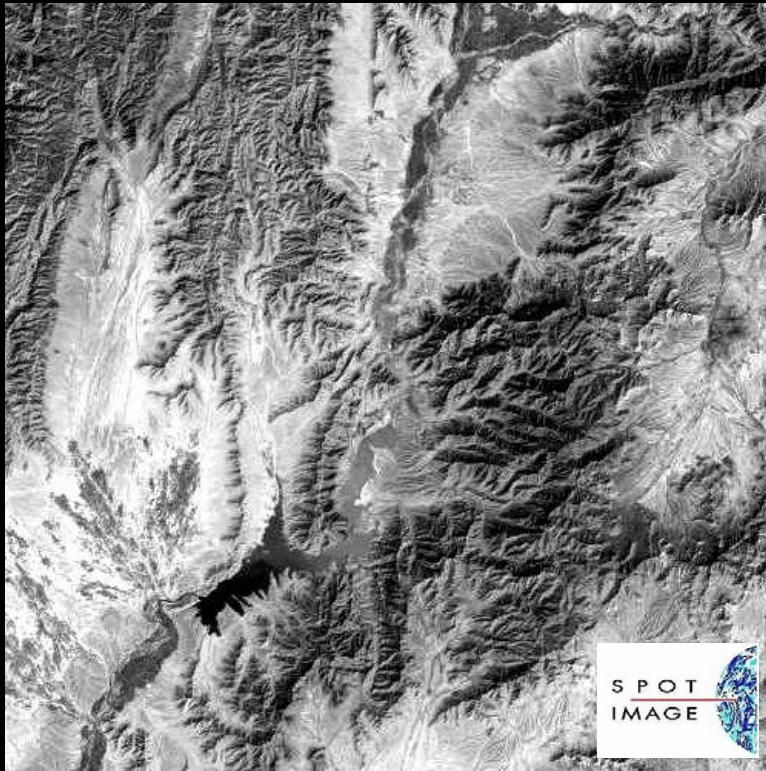


Image date 02/26/06

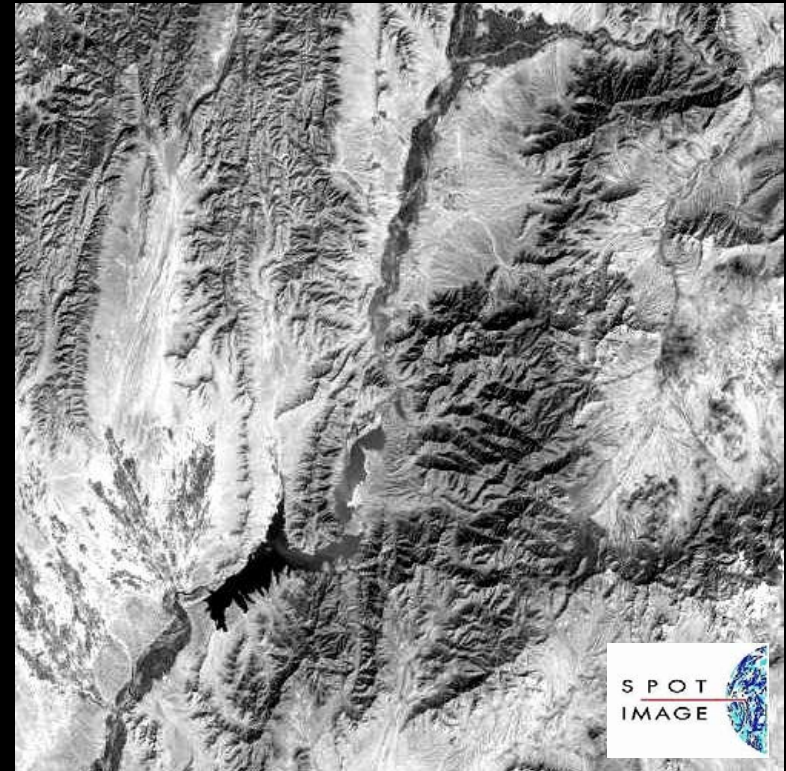
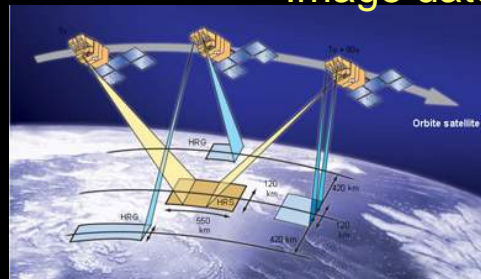
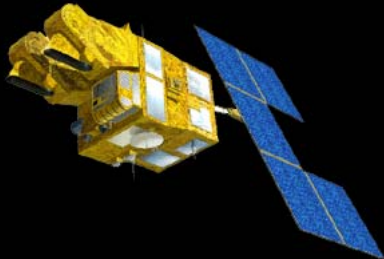
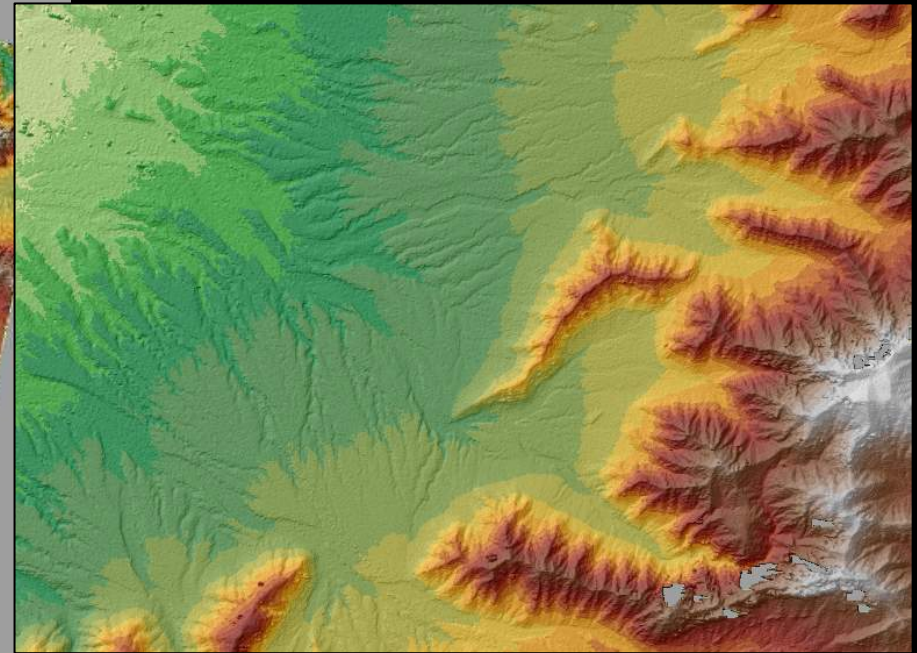
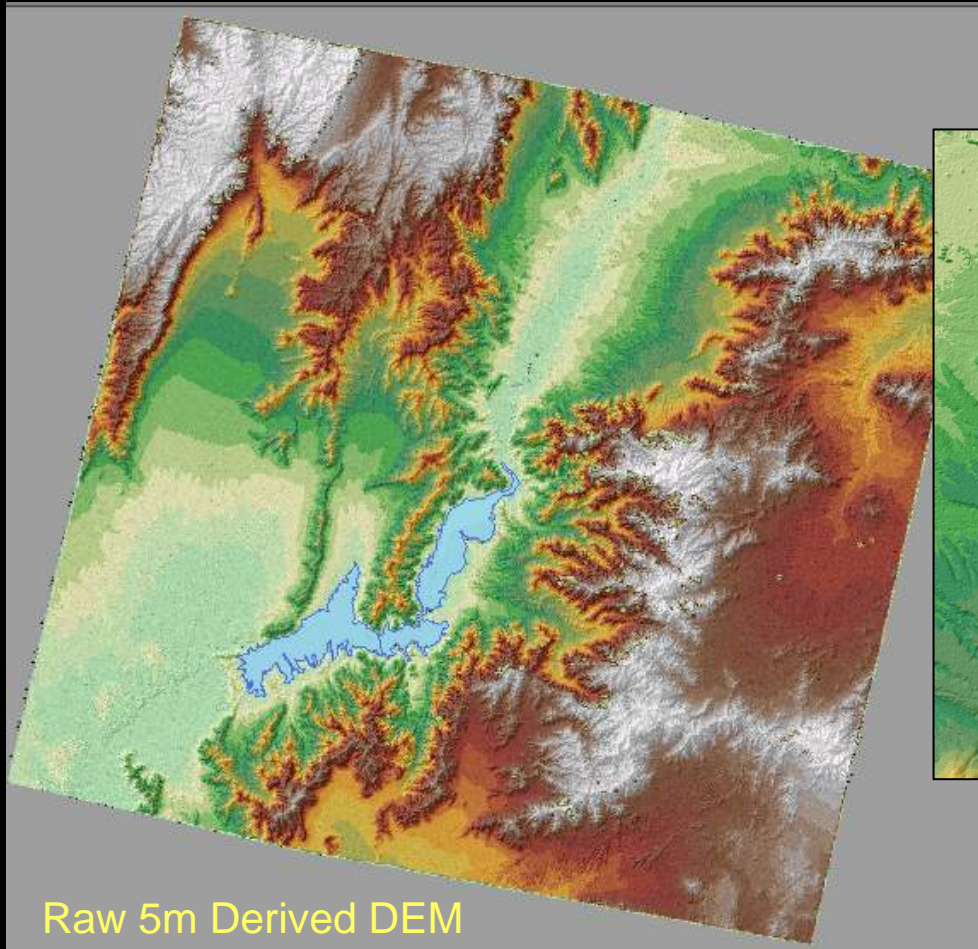


Image date 02/27/06

Image Credit:
SPOT Image
Corporation



SPOT Derived 5m Resolution DEM

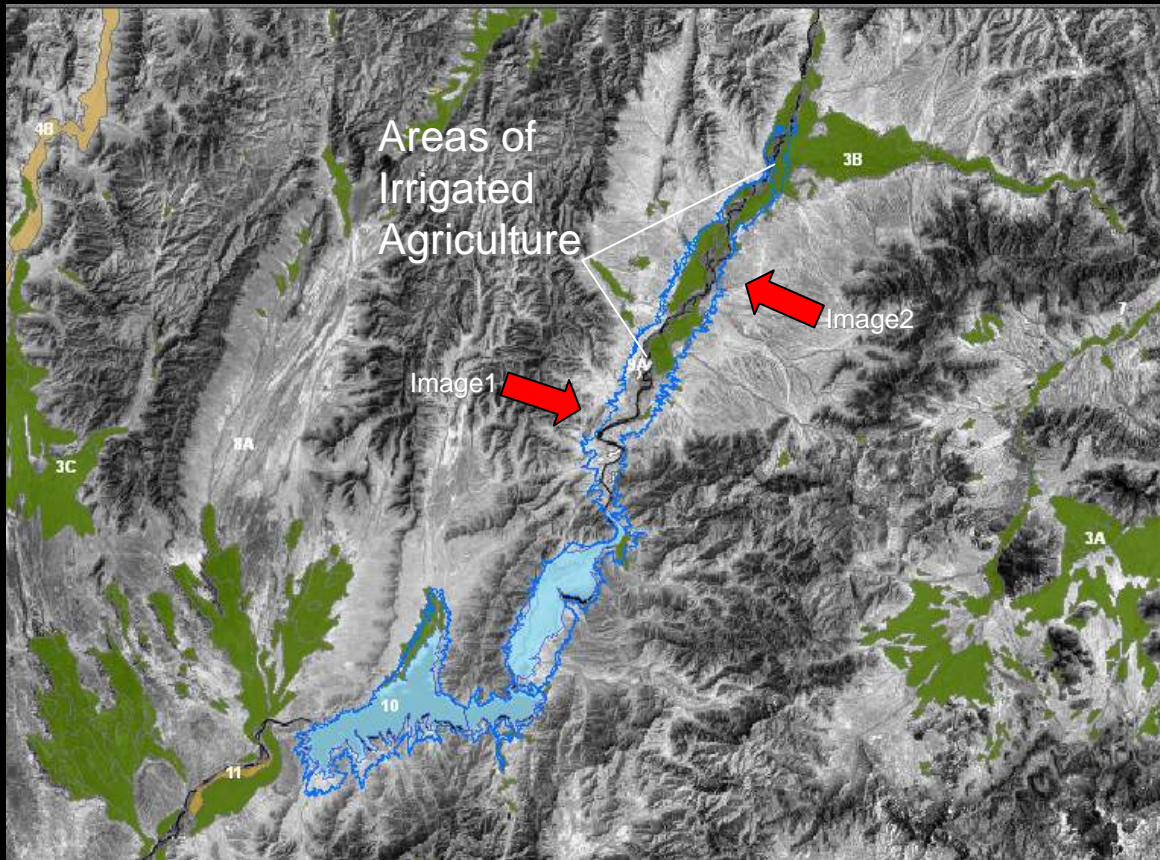


Qualitative Elevation Comparison Results



Image Credit: Digital Globe, Inc.

New Reservoir Impact to Landuse/Landcover



Landsat Image



Conclusion



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